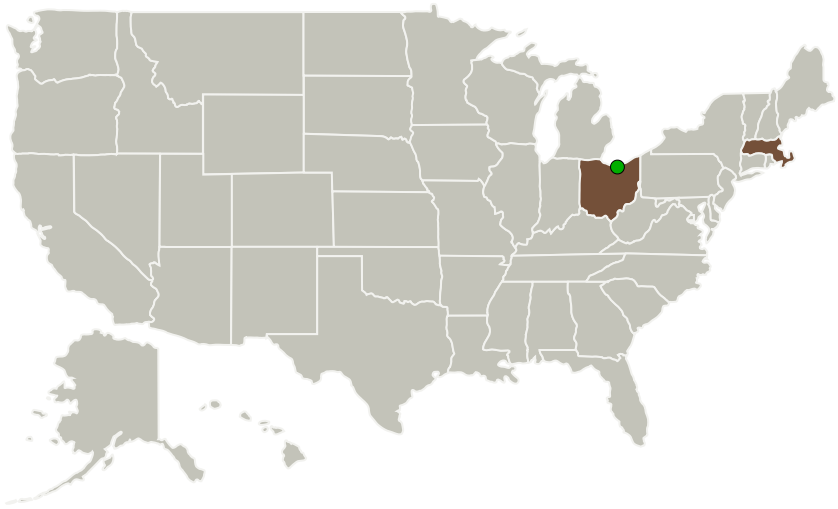
Metallic Fiber Papers for Gas Diffusion Layers, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Hydrogen/oxygen polymer electrolyte fuel cells (PEMFCs) are an attractive means of generating electricity in lunar and space applications due to their high energy density. The PEMFC generally consists of an MEA supported on two sides by gas diffusion media. The gas diffusion media of choice is generally carbon-based in the form of a carbon fiber paper, or carbon cloth material. In the standard operating environment of a H2/O2 fuel cell the anode and cathode potentials are near 0 and 0.7-1.0, respectively. Carbon is generally stable in this potential range. Due to flooding, or during shut-down and start-up, oxygen may permeate the membrane and consume all of the hydrogen at the anode. If this occurs localized voltages above 1.6 V are possible, well above the carbon corrosion potential. For this reason GES proposes to replace the carbon fiber paper based gas diffusion media with an equivalent metallic fiber paper. GES has already demonstrated the electrochemical suitability of these materials by operating them in an electrolyzer for > 3500 hours above 1.7 V. The major challenge is to wet-proof the metallic media to avoid flooding from fuel cell product water.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Giner, Inc.	Lead Organization	Industry	Newton, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138297)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Giner, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Cortney K Mittelsteadt

Co-Investigator:

Cortney Mittelsteadt

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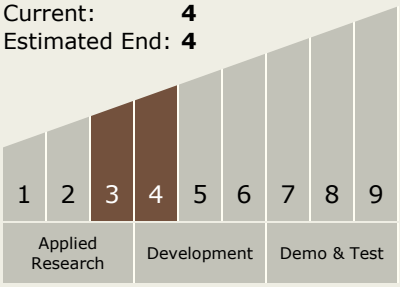
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.4 Dynamic Energy Conversion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System